CLAIMS

What is claimed is:

1. An inlet for a jet engine having variable geometry to alter airflow, the inlet comprising:

lip structure defining the inlet; and

an actuator structure associated with at least a portion of the lip structure to vary the geometry of the inlet.

2. The inlet of claim 1, wherein the geometry of the inlet is variable between at least a:

a first configuration in which the at least a portion of the lip structure forms a rounded inlet lip portion extending forwardly of the inlet; and

a second configuration in which the at least a portion of the lip structure forms an aerodynamically smooth outer surface of the housing.

3. The inlet of claim 1, wherein the actuator structure is coupled to the at least a portion of the lip structure at two points to alter the curvature of the at least a portion of the lip structure about the two points.

4. The inlet of claim 1, wherein the actuator structure includes a linkage assembly.

5. The inlet of claim 4, wherein the linkage assembly includes a four-bar linkage.

6. The inlet of claim 1, wherein the inlet comprises a side inlet.

7. A jet engine comprising the inlet of claim 1.

8. An aircraft comprising the jet engine of claim 7.

9. A method to increase area of an inlet for a jet engine having a lip, the method comprising actuating a flap assembly near the lip to extend a control surface into a flow stream and to increase area of the inlet.

10. The method of claim 9, further comprising actuating the flap assembly to retract the control surface.

11. The method of claim 9, wherein actuating the flap assembly to extend the control surface reduces turbulence of the flow stream into the inlet.

12. The method of claim 9, wherein actuating the flap assembly alters a curvature of the control surface.

13. A jet engine for a mobile platform, the engine comprising:

a housing including a forward end portion and an inlet formed at the forward end portion;

a variable camber skin portion hingedly coupled to the forward end portion;

a linkage assembly coupled to the forward end portion and the skin portion, the linkage assembly operating to rotate the skin portion relative to the forward end portion and to alter a curvature of the skin portion to thereby configure the skin portion into a corresponding one of a plurality of configurations, the plurality of configurations including at least:

a first configuration in which the skin portion forms a rounded inlet lip portion extending forwardly of the inlet; and

a second configuration in which the skin portion and the linkage assembly are retracted within a recessed area in the housing to form an outer surface of the housing.

14. The engine of claim 13, wherein the skin portion in the second configuration forms an aerodynamically smooth outer surface of the housing.

15. The engine of claim 13, wherein:

the mobile platform comprises an aircraft;

the first configuration is used during takeoff and landing of the aircraft; and

the second configuration is used while the aircraft is in a cruise mode of operation.

16. The engine of claim 13, wherein the linkage assembly is coupled to the skin portion at two points to alter the curvature of the skin portion about the two points.

17. The engine of claim 13, further comprising an actuator coupled to the linkage assembly and the forward end portion for extending and retracting the linkage assembly.

18. The engine of claim 17, wherein the linkage assembly includes a four-bar linkage.

19. The engine of claim 13, wherein the housing comprises a nacelle.

20. The engine of claim 13, wherein the inlet comprises a side inlet.

21. The engine of claim 13, wherein:

the inlet includes a first inlet lip portion and a second inlet lip portion disposed aft of the first inlet lip portion; and

the skin portion is hingedly coupled to the second inlet lip portion.

22. An aircraft comprising the engine of claim 13.

23. An aircraft, comprising:

an engine nacelle including a forward end portion and an inlet formed at the forward end portion;

a variable camber skin portion hingedly coupled to the forward end portion;

a linkage assembly coupled to the forward end portion and the skin portion, the linkage assembly operating to rotate the skin portion relative to the forward end portion and to alter a curvature of the skin portion to thereby configure the skin portion into a corresponding one of a plurality of configurations, the plurality of configurations including at least:

a first configuration in which the skin portion forms a rounded inlet lip portion extending forwardly of the inlet; and

a second configuration in which the skin portion and the linkage assembly are retracted within a recessed area in the nacelle to form an outer surface of the nacelle.

24. The aircraft of claim 23, wherein the skin portion in the second configuration forms an aerodynamically smooth outer surface of the housing.

25. The aircraft of claim 23, wherein:

the first configuration is used during takeoff and landing of the aircraft; and

the second configuration is used while the aircraft is in a cruise mode of operation.

26. The aircraft of claim 23, wherein the linkage assembly is coupled to the skin portion at two points to alter the curvature of the skin portion about the two points.

27. The aircraft of claim 23, further comprising an actuator coupled to the linkage assembly and the forward end portion for extending and retracting the linkage assembly.

28. The aircraft of claim 23, wherein the linkage assembly includes a four-bar linkage.

29. The aircraft of claim 23, wherein the inlet comprises a side inlet.

30. The aircraft of claim 23, wherein:

the inlet includes a first inlet lip portion and a second inlet lip portion disposed aft of the first inlet lip portion; and

the skin portion is hingedly coupled to the second inlet lip portion.

31. Apparatus for varying inlet lip geometry of an inlet formed at a forward end portion of a housing for a jet engine, the apparatus comprising:

a variable camber skin portion hingedly coupled to the forward end portion;

a linkage assembly coupled to the forward end portion and the skin portion, the linkage assembly operating to rotate the skin portion relative to the forward end portion and to alter a curvature of the skin portion to thereby configure the skin portion into a corresponding one of a plurality of configurations, the plurality of configurations including at least:

a first configuration in which the skin portion forms a rounded inlet lip portion extending forwardly of the inlet; and

a second configuration in which the skin portion and the linkage assembly are retracted within a recessed area in the housing to form an outer surface of the housing.

32. The apparatus of claim 31, wherein the skin portion in the second configuration forms an aerodynamically smooth outer surface of the housing.

33. The apparatus of claim 31, wherein the linkage assembly is coupled to the skin portion at two points to alter the curvature of the skin portion about the two points.

34. The apparatus of claim 31, further comprising an actuator coupled to the linkage assembly and the forward end portion for extending and retracting the linkage assembly.

35. The apparatus of claim 34, wherein the linkage assembly includes a four-bar linkage.

36. The apparatus of claim 31, wherein the housing comprises a nacelle.

37. The apparatus of claim 31, wherein the inlet comprises a side inlet.

38. The apparatus of claim 31, wherein:

the inlet includes a first inlet lip portion and a second inlet lip portion disposed aft of the first inlet lip portion; and

the skin portion is hingedly coupled to the second inlet lip portion.

39. A jet engine comprising the apparatus of claim 31.

40. An aircraft comprising the apparatus of claim 31.

41. A method of operating a jet engine supported within a housing, the housing including a forward end portion and an inlet formed at the forward end portion, the method comprising:

hingedly coupling a variable camber skin portion to the forward end portion of the housing;

coupling a linkage assembly to the forward end portion and the skin portion; and

operating the linkage assembly to rotate the skin portion relative to the forward end portion and to alter a curvature of the skin portion to thereby configure the skin portion into a corresponding one of a plurality of configurations, the plurality of configurations including at least:

a first configuration in which the skin portion forms a rounded inlet lip portion extending forwardly of the inlet; and

a second configuration in which the skin portion and the linkage assembly are retracted within a recessed area in the housing to form an outer surface of the housing.

42. The method of claim 41, wherein the skin portion in the second configuration forms an aerodynamically smooth outer surface of the housing.

43. The method of claim 41, wherein:

the engine is mounted on an aircraft;

the first configuration is used during takeoff and landing of the aircraft; and

the second configuration is used while the aircraft is in a cruise mode of operation.

44. The method of claim 41, wherein operating the linkage assembly comprises extending and retracting the linkage assembly.

45. The method of claim 44, wherein extending and retracting the linkage assembly comprises actuating an actuator coupled to the linkage assembly.